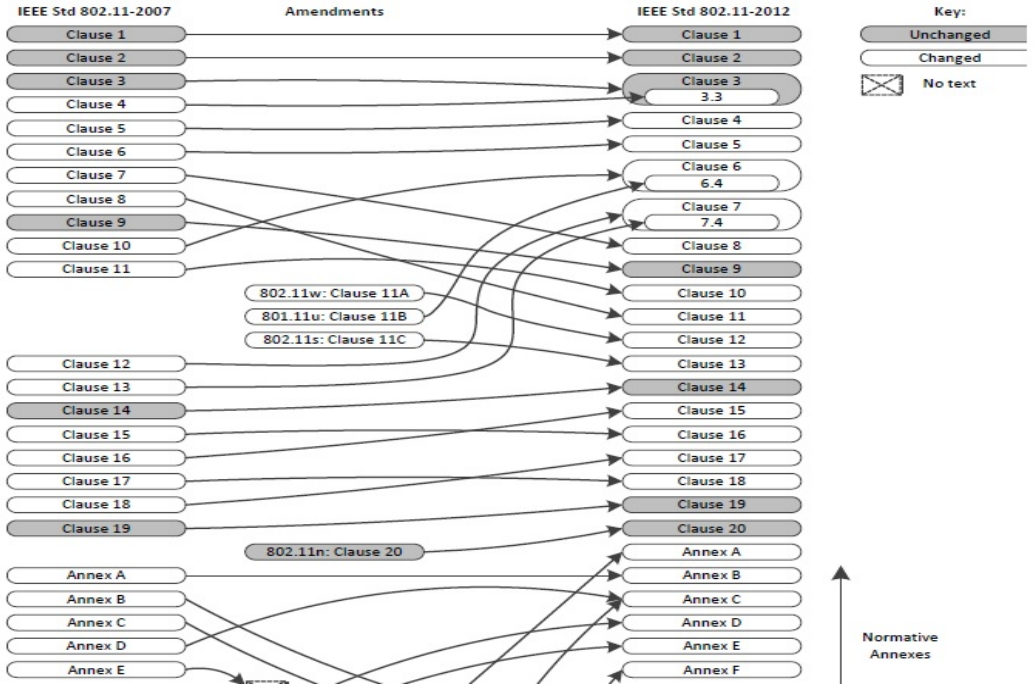
EXHIBIT 2

CLAIM CHART: Infringement of Claim 18 of U.S. Patent No. 6,504,886 by the Nighthawk X10 Smart Wi-Fi Router

Claim 18	Infringement
A communication device capable of communicating a learning sequence descriptor for use in constructing a learning sequence, said device comprising:	The Nighthawk X10 Smart Wi-Fi Router includes a communication device.  The communication device is compliant with and operates pursuant to the WiFi Standard. *See https://www.netgear.com/support/product/r9000.aspx* Clause 20 (High Throughput [HT] PHY) of the WiFi Standard references and includes the claimed communication device:

Claim 18	Infringement



See, e.g, IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Figure A.

The Nighthawk X10 Smart Wi-Fi Router is capable of communicating a learning sequence descriptor (HT-SIG) for use in constructing a learning sequence (one or more HT Long Training fields [Data HT-LTFs] within the HT-mixed format preamble).

The mandatory requirements of Clause 20 of the WiFi Standard describe the communication device for communicating a learning sequence descriptor (HT-SIG) used in constructing a learning sequence (one or more HT Long Training fields [Data HT-LTFs] within the HT-mixed format preamble).

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	"20.1.2 Scope The services provided to the MAC by the HT PHY consist of two protocol functions, defined as follows: a) A PHY convergence function, which adapts the capabilities of the physical medium dependent (PMD) system to the PHY service. This function is supported by the physical layer convergence procedure (PLCP), which defines a method of mapping the PSDUs into a framing format (PPDU) suitable for sending and receiving PSDUs between two or more STAs using the associated PMD system." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.1.2. **"20.1.3.2 HT PMD sublayer** The HT PMD sublayer provides a means to send and receive data between two or more STAs. This clause is concerned with the 2.4 GHz and 5 GHz frequency bands using HT OFDM modulation." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.1.3.2. "**20.3.9.4 HT portion of HT-mixed format preamble** **20.3.9.4.1 Introduction** When an HT-mixed format preamble is transmitted, the HT preamble consists of the HT-STF, the HT-LTFs, and the HT-SIG." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.4.1

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	"**20.3.9.4.3 HT-SIG definition** The HT-SIG is used to carry information required to interpret the HT packet formats. The fields of the HT-SIG are described in Table 20-10." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.4.3.
a transmitter; and	The Nighthawk X10 Smart Wi-Fi Router includes a transmitter. Clause 20 of the Wi-Fi Standard references and includes a transmitter: "Figure 20-2 and Figure 20-3 show example transmitter block diagrams. In particular, Figure 20-2 shows the transmitter blocks used to generate the HT-SIG of the HT-mixed format PPDU. These transmitter blocks are also used to generate the non-HT portion of the HT-mixed format PPDU, except that the BCC encoder and interleaver are not used when generating the L-STF and L-LTFs. Figure 20-3 shows the transmitter blocks used to generate the Data field of the HT-mixed format and HT-greenfield format PPDUs. A subset of these transmitter blocks consisting of the constellation mapper and CSD blocks, as well as the blocks to the right of, and including, the spatial mapping block, are also used to generate the HT-STF, HT-GF-STF, and HT-LTFs. The HT-greenfield format SIGNAL field is generated using the transmitter blocks shown in Figure 20-2, augmented by additional CSD and spatial mapping blocks." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.3.

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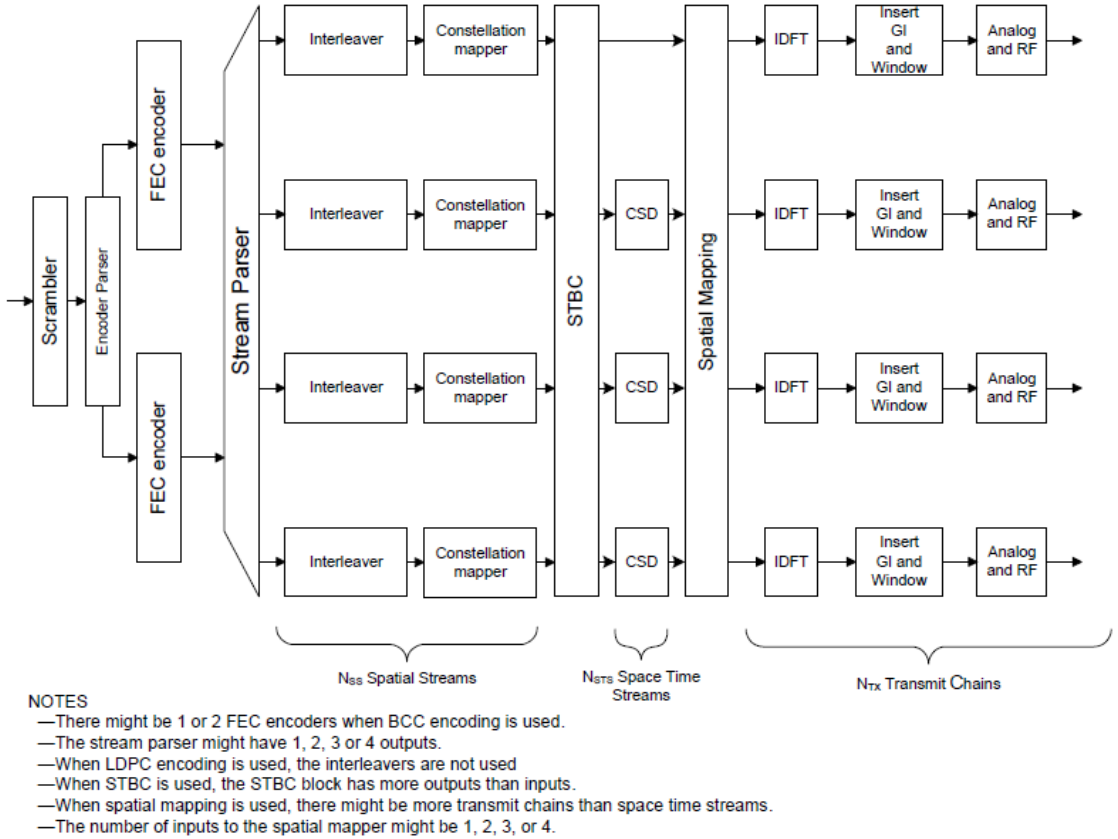

NOTES
—There might be 1 or 2 FEC encoders when BCC encoding is used.
—The stream parser might have 1, 2, 3 or 4 outputs.
—When LDPC encoding is used, the interleavers are not used
—When STBC is used, the STBC block has more outputs than inputs.
—When spatial mapping is used, there might be more transmit chains than space time streams.
—The number of inputs to the spatial mapper might be 1, 2, 3, or 4.

Figure 20-3—Transmitter block diagram 2

See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - Figure 20-3.

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a processor in communication with said transmitter;	The Nighthawk X10 Smart Wi-Fi Router includes a processor in communication with said transmitter. The processor communicates with the transmitter using the TXVECTOR. **"20.2 HT PHY service interface** **20.2.1 Introduction** The PHY interfaces to the MAC through the TXVECTOR, TXSTATUS, RXVECTOR, and PHYCONFIG_VECTOR. The TXVECTOR supplies the PHY with per-packet transmit parameters. Status of the transmission is reported from PHY to MAC by parameters within TXSTATUS. Using the RXVECTOR, the PHY informs the MAC of the received packet parameters. Using the PHYCONFIG_VECTOR, the MAC configures the PHY for operation, independent of frame transmission or reception." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.2.1. The processor uses the TXVECTOR to supply the transmitter with per-packet transmit parameters:

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Table 20-1—TXVECTOR and RXVECTOR parameters

Parameter	Condition	Value	TXVECTOR	RXVECTOR
			See NOTE 1	
FORMAT		Determines the format of the PPDU. Enumerated type: NON_HT indicates Clause 16, Clause 18, Clause 17, or Clause 19 PPDU formats or non-HT duplicated PPDU format. In this case, the modulation is determined by the NON_HT_MODULATION parameter. HT_MF indicates HT-mixed format. HT_GF indicates HT-greenfield format.	Y	Y
NON_HT_MODULATION	FORMAT is NON_HT	Enumerated type: ERP-DSSS ERP-CCK ERP-OFDM ERP-PBCC DSSS-OFDM OFDM NON_HT_DUP_OFDM	Y	Y
	Otherwise	Not present		
L_LENGTH	FORMAT is NON_HT	Indicates the length of the PSDU in octets in the range of 1 to 4095. This value is used by the PHY to determine the number of octet transfers that occur between the MAC and the PHY.	Y	Y
	FORMAT is HT_MF	Indicates the value in the Length field of the L-SIG in the range of 1 to 4095. This use is defined in 9.23.4. This parameter may be used for the protection of more than one PPDU as described in 9.23.5.	Y	Y
	FORMAT is HT_GF	Not present	N	N

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Table 20-1—TXVECTOR and RXVECTOR parameters *(continued)*

Parameter	Condition	Value	TXVECTOR See NOTE 1	RXVECTOR
L_DATARATE	FORMAT is NON_HT	Indicates the rate used to transmit the PSDU in megabits per second. Allowed values depend on the value of the NON_HT_MODULATION parameter as follows: ERP-DSSS: 1 and 2 ERP-CCK: 5.5 and 11 ERP-PBCC: 5.5, 11, 22, and 33 DSSS-OFDM, ERP-OFDM, NON_HT_DUP_OFDM: 6, 9, 12, 18, 24, 36, 48, and 54 OFDM: 6, 9, 12, 18, 24, 36, 48, and 54	Y	Y
	FORMAT is HT_MF	Indicates the data rate value that is in the L-SIG. This use is defined in 9.23.4.	Y	Y
	FORMAT is HT_GF	Not present	N	N
LSIGVALID	FORMAT is HT_MF	True if L-SIG Parity is valid False if L-SIG Parity is not valid	N	Y
	Otherwise	Not present	N	N
SERVICE	FORMAT is NON_HT and NON_HT_MODULATION is one of — DSSS-OFDM — ERP-OFDM — OFDM	Scrambler initialization, 7 null bits + 9 reserved null bits	Y	N
	FORMAT is HT_MF or HT_GF	Scrambler initialization, 7 null bits + 9 reserved null bits	Y	N
	Otherwise	Not present	N	N
TXPWR_LEVEL		The allowed values for the TXPWR_LEVEL parameter are in the range from 1 to 8. This parameter is used to indicate which of the available TxPowerLevel attributes defined in the MIB shall be used for the current transmission.	Y	N
RSSI		The allowed values for the RSSI parameter are in the range from 0 to RSSI maximum. This parameter is a measure by the PHY of the power observed at the antennas used to receive the current PPDU. RSSI shall be measured during the reception of the PLCP preamble. In HT-mixed format, the reported RSSI shall be measured during the reception of the HT-LTFs. RSSI is intended to be used in a relative manner, and it shall be a monotonically increasing function of the received power.	N	Y

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Table 20-1—TXVECTOR and RXVECTOR parameters *(continued)*

Parameter	Condition	Value	TXVECTOR See NOTE 1	RXVECTOR
PREAMBLE_TYPE	FORMAT is NON_HT and NON_HT_MODULATION is one of — ERP-DSSS — ERP-CCK — ERP-PBCC — DSSS-OFDM	Enumerated type: SHORTPREAMBLE LONGPREAMBLE	Y	Y
	Otherwise	Not present	N	N
MCS	FORMAT is HT_MF or HT_GF	Selects the modulation and coding scheme used in the transmission of the packet. The value used in each MCS is the index defined in 20.6. Integer: range 0 to 76. Values of 77 to 127 are reserved. The interpretation of the MCS index is defined in 20.6.	Y	Y
	Otherwise	Not present	N	N
REC_MCS	FORMAT is HT_MF or HT_GF	Indicates the MCS that the STA's receiver recommends.	N	O
	Otherwise	Not present	N	N
CH_BANDWIDTH	FORMAT is HT_MF or HT_GF	Indicates whether the packet is transmitted using 40 MHz or 20 MHz channel width. Enumerated type: HT_CBW20 for 20 MHz and 40 MHz upper and 40 MHz lower modes HT_CBW40 for 40 MHz	Y	Y
	FORMAT is NON_HT	Enumerated type: NON_HT_CBW40 for non-HT duplicate format NON_HT_CBW20 for all other non-HT formats	Y	Y

NOTE 1—In the "TXVECTOR" and "RXVECTOR" columns, the following apply:
Y = Present; N = Not present; O = Optional
NOTE 2—Setting the smoothing bit is defined in 20.3.11.11.2.

See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - Table 20-1.

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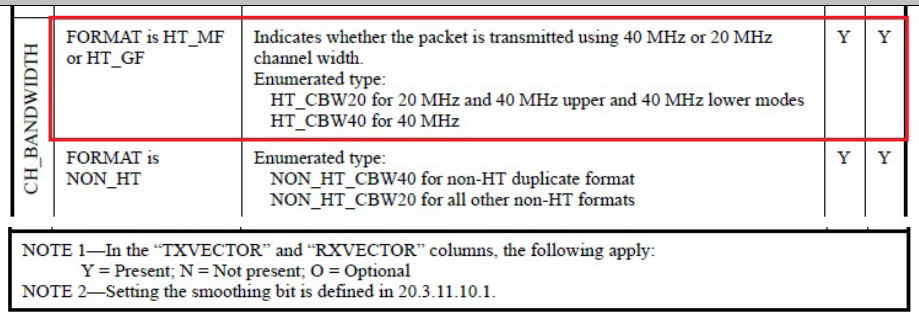
wherein said processor is capable of providing a first parameter, a second parameter and a third parameter to said transmitter capable of transmitting said parameters, wherein…	The Nighthawk X10 Smart Wi-Fi Router includes a processor that provides the first parameter which specifies the number of segments in the learning sequence (N_{HTDLTF}) to the transmitter. The processor also provides the second parameter which specifies the sign pattern of each of segments to the transmitter. The processor also provides the third parameter which specifies the training pattern of each of segments to the transmitter. The transmitter can transmit these parameters.

Table 20-1—TXVECTOR and RXVECTOR parameters *(continued)*

Parameter	Condition	Value	TXVECTOR (See NOTE 1)	RXVECTOR
PREAMBLE_TYPE	FORMAT is NON_HT and NON_HT_MODULATION is one of — ERP-DSSS — ERP-CCK — ERP-PBCC — DSSS-OFDM	Enumerated type: SHORTPREAMBLE LONGPREAMBLE	Y	Y
	Otherwise	Not present	N	N
MCS	FORMAT is HT_MF or HT_GF	Selects the modulation and coding scheme used in the transmission of the packet. The value used in each MCS is the index defined in 20.6. Integer: range 0 to 76. Values of 77 to 127 are reserved. The interpretation of the MCS index is defined in 20.6.	Y	Y
	Otherwise	Not present	N	N
MCS	FORMAT is HT_MF or HT_GF	Indicates the MCS that the STA's receiver recommends.	N	O
AGGREGATION	FORMAT is HT_MF or HT_GF	Indicates whether the PSDU contains an A-MPDU. Enumerated type: AGGREGATED indicates this packet has A-MPDU aggregation. NOT_AGGREGATED indicates this packet does not have A-MPDU aggregation.	Y	Y
	Otherwise	Not present	N	N
STBC	FORMAT is HT_MF or HT_GF	Indicates the difference between the number of space-time streams (N_{STS}) and the number of spatial streams (N_{SS}) indicated by the MCS as follows: 0 indicates no STBC ($N_{STS} = N_{SS}$). 1 indicates $N_{STS} - N_{SS} = 1$. 2 indicates $N_{STS} - N_{SS} = 2$. Value of 3 is reserved.	Y	Y
	Otherwise	Not present	N	N

Claim 18	Infringement
	 CH_BANDWIDTH FORMAT is HT_MF or HT_GF — Indicates whether the packet is transmitted using 40 MHz or 20 MHz channel width. Enumerated type: HT_CBW20 for 20 MHz and 40 MHz upper and 40 MHz lower modes; HT_CBW40 for 40 MHz — Y Y FORMAT is NON_HT — Enumerated type: NON_HT_CBW40 for non-HT duplicate format; NON_HT_CBW20 for all other non-HT formats — Y Y NOTE 1—In the "TXVECTOR" and "RXVECTOR" columns, the following apply: Y = Present; N = Not present; O = Optional NOTE 2—Setting the smoothing bit is defined in 20.3.11.10.1. *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - Table 20-1.
said first parameter specifies a number of segments in said learning sequence,	The Nighthawk X10 Smart Wi-Fi Router transmits HT-SIG, within the HT-mixed format preamble, which includes the first parameter specifying the number of segments (the number of Data HT-LTFs - N_{HTDLTF}) in the learning sequence. The number of segments N_{HTDLTF} is specified by the MCS and STBC fields contained within the HT-SIG. "**20.3.9.4 HT portion of HT-mixed format preamble** **20.3.9.4.1 Introduction** When an HT-mixed format preamble is transmitted, the HT preamble consists of the HT-STF, the HT-LTFs, and the HT-SIG." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.4.1 "The HT-LTF portion has one or two parts. The first part consists of one, two, or four HT-LTFs that are necessary for demodulation of the HT-Data portion of the PPDU. These HT-LTFs are referred to as HT-DLTFs." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.4.6

Claim 18	Infringement
	The WiFi Standard uses MIMO (multiple input, multiple output) technology for High Throughput (HT) data capability. MIMO employs multiple antennas to transmit/receive more information than would be possible using single antennas. This additional transmit capacity may be provided through Spatial Division Multiplexing (SDM), which spatially multiplexes multiple independent data streams, transferred simultaneously within one spectral channel. Each spatial stream (spatial channel) requires a discrete antenna at both the transmitter and the receiver. The learning sequence descriptor HT-SIG includes the MCS (hence N_{ss} number of spatial streams) and STBC (Space time block code) fields, which together determine the number of space-time steams, calculated by the formula: $$N_{STS}=STBC+N_{ss}$$ From this, the number of segments (HT-LTFs) in the learning sequence (N_{HTDLTF}) is found using Table 20-12 below, which determines the relationship between N_{STS} and N_{HTDLTF}. "The MCS is a value that determines the modulation, coding, and number of spatial channels. It is a compact representation that is carried in the HT-SIG. Rate-dependent parameters for the full set of MCSs are shown in Table 20-29 through Table 20-43 (in 20.6). These tables give rate-dependent parameters for MCSs with indices 0 through 76. MCSs with indices 0 to 7 and 32 have a single spatial stream; MCSs with indices 8 to 31 have multiple spatial streams using equal modulation (EQM) on all the streams; MCSs with indices 33 to 76 have multiple spatial streams using unequal modulation (UEQM) on the spatial streams. MCS indices 77 to 127 are reserved." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.5.

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Table 20-12—Number of HT-DLTFs required for data space-time streams

N_{STS}	N_{HTDLTF}
1	1
2	2
3	4
4	4

See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Table 20-12

Table 20-11—Determining the number of space-time streams

Number of Spatial Streams (from MCS) N_{SS}	STBC field	Number of space-time streams N_{STS}
1	0	1
1	1	2
2	0	2
2	1	3
2	2	4
3	0	3
3	1	4
4	0	4

See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Table 20-11

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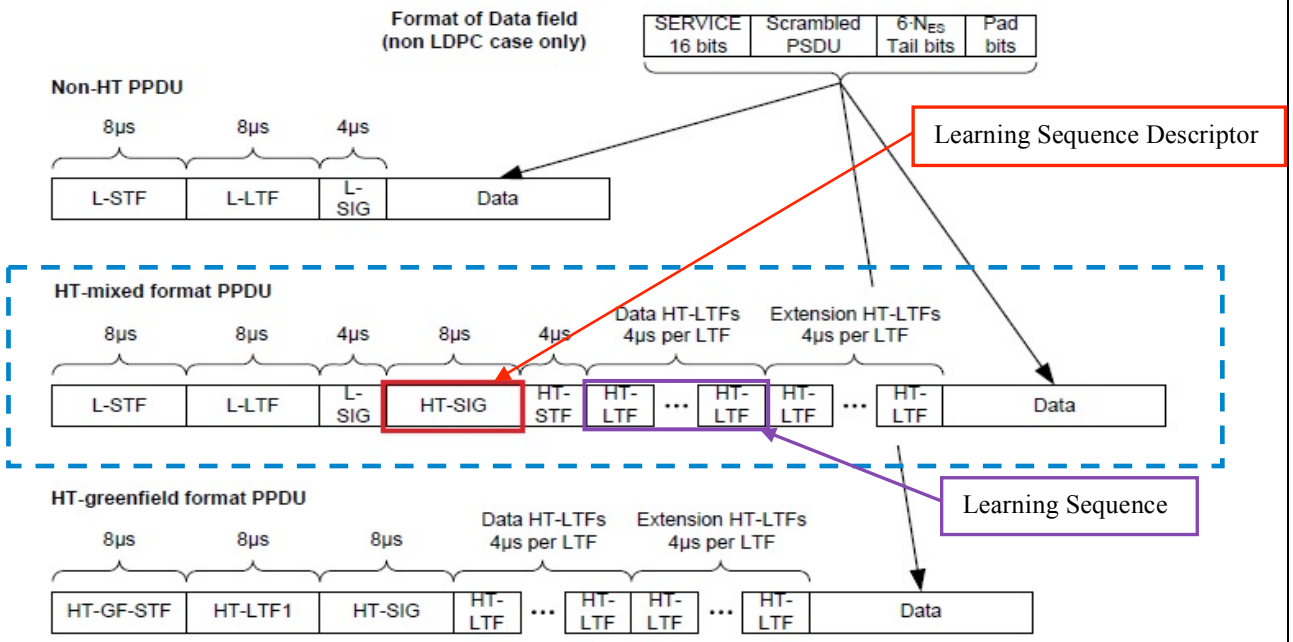
Table 20-11—HT-SIG fields

Field	Number of bits	Explanation and coding
Modulation and Coding Scheme	7	Index into the MCS table. See NOTE 1.
CBW 20/40	1	Set to 0 for 20 MHz or 40 MHz upper/lower. Set to 1 for 40 MHz.
HT Length	16	The number of octets of data in the PSDU in the range of 0 to 65 535. See NOTE 1 and NOTE 2.
Smoothing	1	Set to 1 indicates that channel estimate smoothing is recommended. Set to 0 indicates that only per-carrier independent (unsmoothed) channel estimate is recommended. See 20.3.11.11.2.
Not Sounding	1	Set to 0 indicates that PPDU is a sounding PPDU. Set to 1 indicates that the PPDU is not a sounding PPDU.
Reserved	1	Set to 1.
Aggregation	1	Set to 1 to indicate that the PPDU in the data portion of the packet contains an A-MPDU; otherwise, set to 0.
STBC	2	Set to a nonzero number, to indicate the difference between the number of space-time streams (N_{STS}) and the number of spatial streams (N_{SS}) indicated by the MCS. Set to 00 to indicate no STBC ($N_{STS} = N_{SS}$). See NOTE 1.

See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Table 20-10

Claim 18	Infringement
	 **Figure 20-1—PPDU format** *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Figure 20-1
said second parameter specifies a sign pattern of each of said segments,	The Nighthawk X10 Smart Wi-Fi Router provides a second parameter (STBC - Space time block code) within the Learning Sequence Descriptor (HT-SIG), said second parameter specifying a sign pattern of each of said segments (Data HT-LTFs).

Claim 18	Infringement
	"**20.3.9.4 HT portion of HT-mixed format preamble** **20.3.9.4.1 Introduction** When an HT-mixed format preamble is transmitted, the HT preamble consists of the HT-STF, the HT-LTFs, and the HT-SIG." *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.4.1 The Nighthawk X10 Smart Wi-Fi Router transmits the learning sequence descriptor (HT-SIG) comprising a second parameter (*STBC*). The second parameter specifies the sign pattern of each of the segments of the learning sequence (HT-LTFs) by selecting the row from the HT-LTF mapping matrix P_{HTLTF}. For example, if number of spatial streams N_{ss}=1, the second parameter STBC determines the row into the HT-LTF mapping matrix P_{HTLTF}. **Table 20-11—Determining the number of space-time streams** **Number of Spatial Streams (from MCS) N_{SS}** / **STBC field** / **Number of space-time streams N_{STS}** 1 / 0 / 1 1 / 1 / 2 2 / 0 / 2 2 / 1 / 3 2 / 2 / 4 3 / 0 / 3 3 / 1 / 4 4 / 0 / 4

Claim 18	Infringement
	See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Table 20-11 P_{HTLTF} is the HT-LTF mapping matrix, given by: $$P_{HTLTF} = \begin{bmatrix} 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 \\ -1 & 1 & 1 & 1 \end{bmatrix}$$ *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Equation 20-27. With N_{STS}=2 for example, the sign pattern of the learning segments on the first space-time stream is the following: 1,-1 (+,-) And the sign pattern of the learning segments on the second space-time stream is the following: 1, 1 (+,+) "The generation of HT-DLTFs is shown in Figure 20-9. The generation of HT-ELTFs is shown in Figure 20-10. In these figures, and in the following text, the following notational conventions are used: — $[X]_{m,n}$ indicates the element in row *m* and column *n* of matrix *X* — $[X]_N$ indicates a matrix consisting of the first *N* columns of matrix *X* — $[X]_{M:N}$ indicates a matrix consisting of columns *M* through *N* of matrix *X* Where $M \leq N$, X is either Q_k or P_{HTLTF}"

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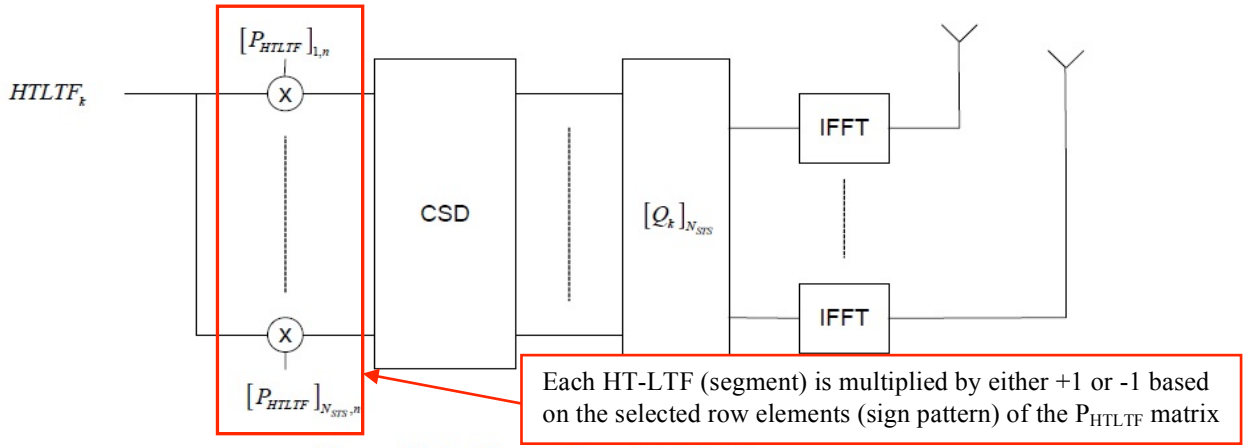

Figure 20-9—Generation of HT-DLTFs

See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Figure 20-9.

Where P_{HTLTF} the HT-LTF mapping matrix, is given by

$$P_{HTLTF} = \begin{bmatrix} 1 & -1 & 1 & 1 \\ 1 & 1 & -1 & 1 \\ 1 & 1 & 1 & -1 \\ -1 & 1 & 1 & 1 \end{bmatrix}$$

The time domain representation of the waveform transmitted on transmit chain i_{TX} during HT-DLTF n, where $1 \le n \le N_{HTDLTF}$, shall be as shown in Equation (20-25).

$$r_{HT-LTF}^{n,i_{TX}}(t) = \frac{1}{\sqrt{N_{STS} \cdot N_{HT-LTF}^{Tone}}} w_{T_{HT-LTFs}}(t) \cdot \sum_{k=-N_{SR}}^{N_{SR}} \sum_{i_{STS}=1}^{N_{STS}} [Q_k]_{i_{TX},i_{STS}} [P_{HTLTF}]_{i_{STS},n} \Upsilon_k HTLTF_k \exp(j2\pi k\Delta_F(t - T_{GI} - T_{CS}^{i_{STS}})) \quad (20\text{-}25)$$

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	See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.4.6. Therefore, each HT-DLTF$_n$ is generated as follows: $$HTLTF \rightarrow \otimes \leftarrow [P_{HTLTF}]_{N_{STS},n}$$ $$\downarrow$$ $$HTLTF \times [P_{HTLTF}]_{N_{STS},n} = HT - DLTF_n$$ Where $1 \leq n \leq N_{HTDLTF}$ and N_{HTDLTF} is the number of HT-DLTFs segments.

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Table 20-11—HT-SIG fields

Field	Number of bits	Explanation and coding
Modulation and Coding Scheme	7	Index into the MCS table. See NOTE 1.
CBW 20/40	1	Set to 0 for 20 MHz or 40 MHz upper/lower. Set to 1 for 40 MHz.
HT Length	16	The number of octets of data in the PSDU in the range of 0 to 65 535. See NOTE 1 and NOTE 2.
Smoothing	1	Set to 1 indicates that channel estimate smoothing is recommended. Set to 0 indicates that only per-carrier independent (unsmoothed) channel estimate is recommended. See 20.3.11.11.2.
Not Sounding	1	Set to 0 indicates that PPDU is a sounding PPDU. Set to 1 indicates that the PPDU is not a sounding PPDU.
Reserved	1	Set to 1.
Aggregation	1	Set to 1 to indicate that the PPDU in the data portion of the packet contains an A-MPDU; otherwise, set to 0.
STBC	2	Set to a nonzero number, to indicate the difference between the number of space-time streams (N_{STS}) and the number of spatial streams (N_{SS}) indicated by the MCS. Set to 00 to indicate no STBC ($N_{STS} = N_{SS}$). See NOTE 1.

See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Table 20-10

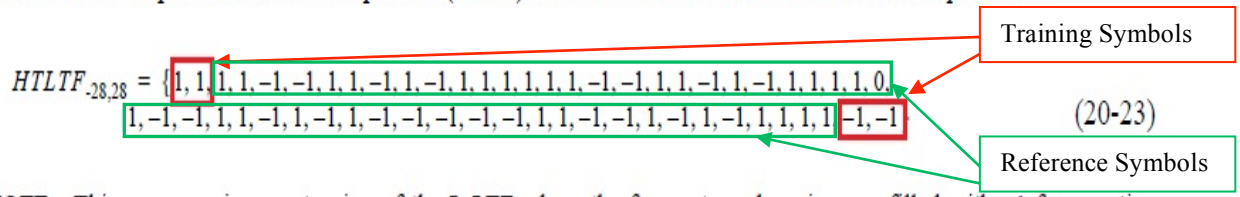
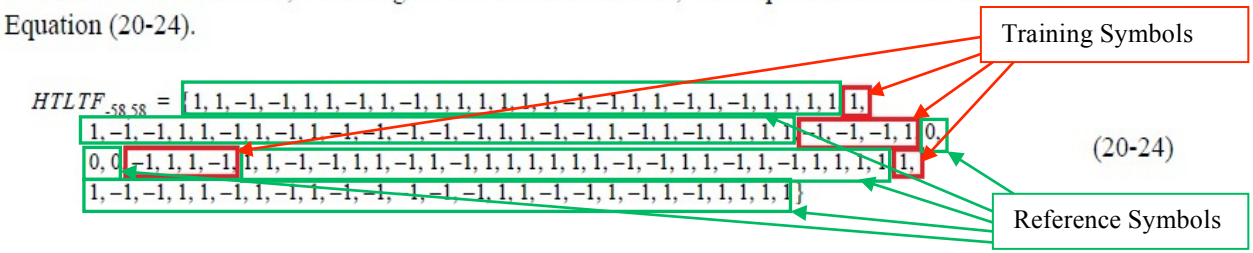
<table>
<tr><th>Claim 18</th><th>Infringement</th></tr>
<tr><td>and said third parameter specifies a training pattern of each of said segments,</td><td>The Nighthawk X10 Smart Wi-Fi Router transmits a third parameter (CBW) included in the learning sequence descriptor (HT-SIG), specifying the wireless channel operation mode (e.g, 20MHz or 40MHz) which further determines the training pattern of each segment (e.g., $HTLTF_{-28,28}$ or $HTLTF_{-58,58}$). The selected training pattern comprises an OFDM (Orthogonal Frequency-Division Multiplexing) symbol of either 57 elements ($HTLTF_{-28,28}$) or 117 elements ($HTLTF_{-58,58}$).

Table 20-10—HT-SIG fields
<table><tr><th>Field</th><th>Number of bits</th><th>Explanation and coding</th></tr><tr><td>Modulation and Coding Scheme</td><td>7</td><td>Index into the MCS table.
See NOTE 1.</td></tr><tr><td>CBW 20/40</td><td>1</td><td>Set to 0 for 20 MHz or 40 MHz upper/lower.
Set to 1 for 40 MHz.</td></tr><tr><td>HT Length</td><td>16</td><td>The number of octets of data in the PSDU in the range of 0 to 65 535.
See NOTE 1 and NOTE 2.</td></tr></table>
See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications – Table 20-10

“Determine whether 20 MHz or 40 MHz operation is to be used from the CH_BANDWIDTH parameter of the TXVECTOR. Specifically, when CH_BANDWIDTH is HT_CBW20 or NON_HT_CBW20, 20 MHz operation is to be used. When CH_BANDWIDTH is HT_CBW40 or NON_HT_CBW40, 40 MHz operation is to be used.”

See, e.g., IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.4.</td></tr>
</table>

Claim 18	Infringement
	The HT-LTF sequence shown in Equation (20-23) is transmitted in the case of 20 MHz operation. $HTLTF_{-28,28} = \{1, 1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 0,$ $1, -1, -1, 1, 1, -1, 1, -1, 1, -1, -1, -1, -1, -1, 1, 1, -1, -1, 1, -1, 1, -1, 1, -1, 1, 1, 1, 1, -1, -1\}$ (20-23) NOTE—This sequence is an extension of the L-LTF where the four extra subcarriers are filled with +1 for negative frequencies and –1 for positive frequencies. In 40 MHz transmissions, including MCS 32 format frames, the sequence to be transmitted is shown in Equation (20-24). $HTLTF_{-58,58} = \{1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1,$ $1, -1, -1, 1, 1, -1, 1, -1, 1, -1, -1, -1, -1, -1, 1, 1, -1, -1, 1, -1, 1, -1, 1, 1, 1, 1, -1, -1, -1, 1, 0,$ $0, 0, -1, 1, 1, -1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1,$ $1, -1, -1, 1, 1, -1, 1, -1, 1, -1, -1, -1, -1, -1, 1, 1, -1, -1, 1, -1, 1, -1, 1, -1, 1, 1, 1, 1\}$ (20-24) *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.4.6.
wherein said training pattern is indicative of an ordering of a reference symbol and a training symbol in each of said segments.	The Nighthawk X10 Smart Wi-Fi Router includes a training pattern that is indicative of an ordering of a reference symbol and a training symbol in each of said segments. When CBW is set to 0, the training pattern for $HTLTF_{-28,28}$ segment shown in the equation 20-23 indicates an ordering of the reference symbols $L\text{-}LTF_{-26,26}$ and the training symbols highlighted below. $L_{-26,26} = \{1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 0,$ $1, -1, -1, 1, 1, -1, 1, -1, 1, -1, -1, -1, -1, -1, 1, 1, -1, -1, 1, -1, 1, -1, 1, 1, 1, 1\}$ (20-11)

Claim 18	Infringement
	The HT-LTF sequence shown in Equation (20-23) is transmitted in the case of 20 MHz operation.  NOTE—This sequence is an extension of the L-LTF where the four extra subcarriers are filled with +1 for negative frequencies and −1 for positive frequencies. *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - §§ 20.3.9.3.4 and 20.3.9.4.6. When CBW is set to 1, training pattern for $HTLTF_{-58,58}$ segment shown in the equation 20-24 indicates an ordering of reference symbols $L\text{-}LTF_{-26,26}$ and the training symbols highlighted below. In 40 MHz transmissions, including MCS 32 format frames, the sequence to be transmitted is shown in Equation (20-24).  NOTE—This sequence is also constructed by extending the L-LTF in the following way: first, the L-LTF is duplicated and shifted as explained in 20.3.9.3.4 for the non-HT duplicate format; then the missing subcarriers [−32, −5, −4, −3, −2, 2, 3, 4, 5, 32] are filled with the values [1, −1, −1, −1, 1, −1, 1, 1, −1, 1], respectively. *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.4.6.

Claim 18	Infringement
	20.3.9.3.4 L-LTF definition The non-HT long training OFDM symbol is identical to the Clause 17 long training OFDM symbol. In the 20 MHz channel width, the long training OFDM symbol is given by Equation (20-11). $L_{-26,26} = \{1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 0,$ $1, -1, -1, 1, 1, -1, 1, -1, 1, -1, -1, -1, -1, -1, 1, 1, -1, -1, 1, -1, 1, -1, 1, 1, 1, 1\}$ (20-11) The non-HT long training OFDM symbol in a 40 MHz channel width is given by Equation (20-12), after rotating the tones in the upper subchannel (subcarriers 6–58) by +90° (see Equation (20-13)). $L_{-58,58} = \{1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 0,$ $1, -1, -1, 1, 1, -1, 1, -1, 1, -1, -1, -1, -1, -1, 1, 1, -1, -1, 1, -1, 1, -1, 1, -1, 1, 1, 1, 1, 0, 0, 0, 0, 0,$ $0, 0, 0, 0, 0, 0, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 1, 1, -1, -1, 1, 1, -1, 1, -1, 1, 1, 1, 1, 0,$ $1, -1, -1, 1, 1, -1, 1, -1, 1, -1, -1, -1, -1, -1, 1, 1, -1, -1, 1, -1, 1, -1, 1, -1, 1, 1, 1, 1\}$ (20-12) The subcarriers at ± 32 in 40 MHz, which are the dc subcarriers for the non-HT 20 MHz transmission, are both nulled in the L-LTF. Such an arrangement allows proper synchronization of a 20 MHz non-HT STA. *See, e.g.,* IEEE Std 802.11™ -2012, IEEE Standard for Information technology– Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - § 20.3.9.3.4